

Volume 21

Study G-I-E

STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY AND CATALOGING OF SPORT FISH
AND SPORT FISH WATERS OF THE BRISTOL BAY AREA

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations
of Alaska

Project No.: F-9-12

Study No.: G-I Study Title: INVENTORY AND CATALOGING

Job No.: G-I-E Job Title: Inventory and Cataloging of
Sport Fish and Sport Fish
Waters of the Bristol Bay
Area.

Period Covered: July 1, 1979 to June 30, 1980.

ABSTRACT

The Bristol Bay area includes all waters flowing into Bristol Bay from Cape Newenham to Port Heiden. Research activities in the area are designed to monitor traditional fisheries and to expand studies into development of potentially important sport fisheries.

The 1979 Naknek River sport harvest of chinook salmon, Onchorhynchus tshawytscha (Walbaum), was estimated to be 2,669 fish, with an escapement of over 7,000 in the drainage.

Dolly Varden char, Salvelinus malma, (Walbaum) were measured and tagged for the second year in the Naknek River. Average lengths are compared and assumptions about the population are made.

Rainbow trout, Salmo gairdneri (Richardson), surveys were made on Copper River and Lower Talarik Creek, in the Kvichak drainage and in Brooks River in the Naknek system. An estimated 55 rainbow trout were retained from Lower Talarik Creek between September 4 and September 24, 1979. Average lengths of rainbows kept are presented.

Arctic grayling, Thymallus arcticus (Pallas), were surveyed at the Lower Ugashik Lake outlet between July 28 and August 5 and a total of 226 grayling were measured and tagged. Average lengths are presented and a comparison to a similar 1978 sample is made. A population estimate of 2,053 grayling was made, based on a codified Peterson estimate.

BACKGROUND

The Bristol Bay area includes all waters flowing into Bristol Bay from Cape Newenham to Port Heiden (Figure 1). The area contains some of the

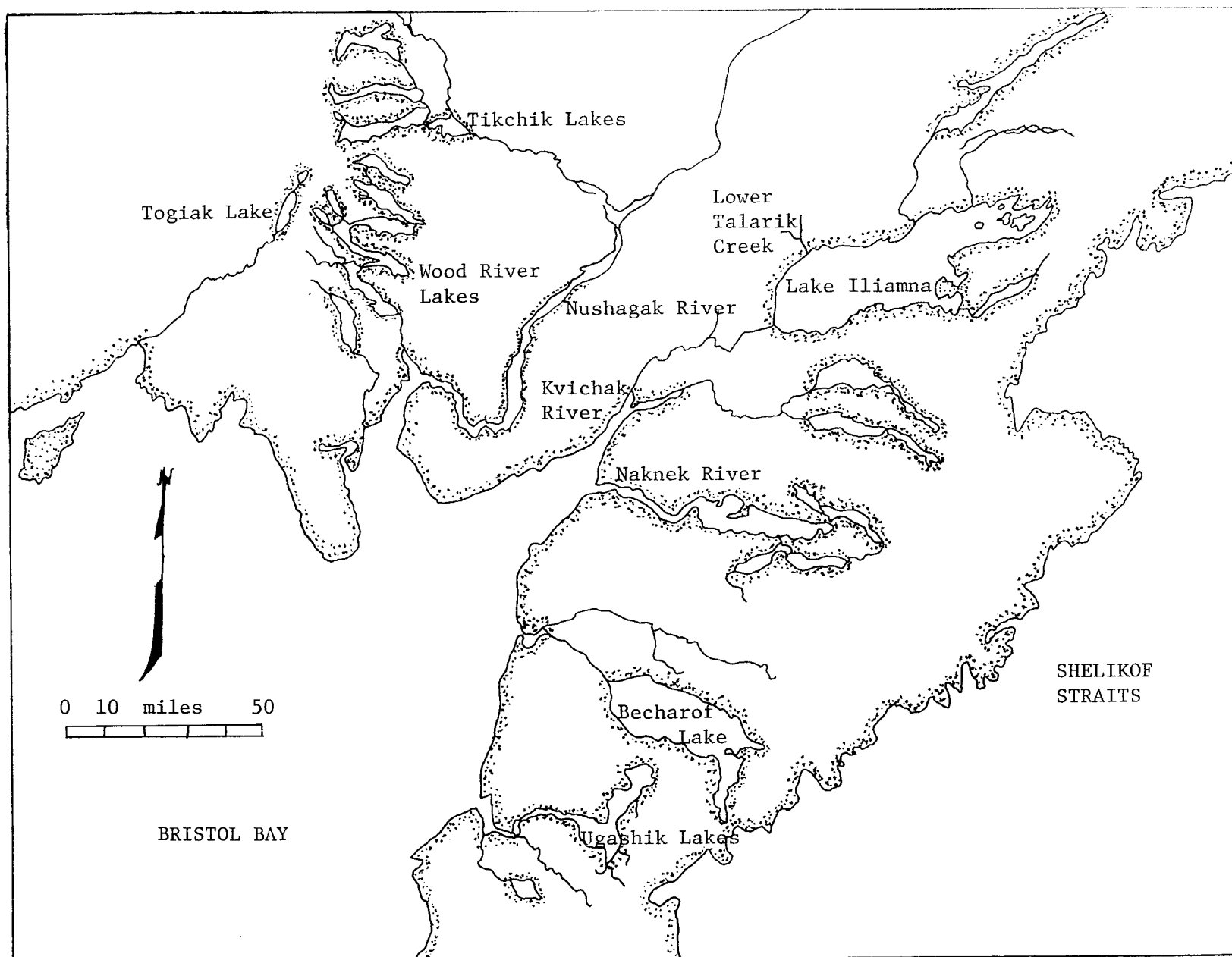


Figure 1 Bristol Bay Study Area.

best recreational fishing waters within the State. While the Kvichak and Naknek drainages have traditionally been sport fished for many years, there is still the opportunity for expansion of the recreational fishery into Bristol Bay area waters unknown to the general public. Many of the professional fishing guides and anglers with airplanes are currently moving into these areas.

One of the major annual sport fisheries in the Bristol Bay area occurs on the Naknek River for chinook salmon (Figure 2). Catches (including sport, subsistence and commercial) and escapements have been estimated since statehood.

Another major fishery occurs within the Lake Iliamna and Naknek Lake drainages for rainbow trout. A comprehensive 6-year study of rainbow trout in Lake Iliamna was completed in 1976 (Russell, 1977). Since this study was completed, rainbow trout spawning surveys and creel censuses have been continued on select streams to determine the minimum numbers of large rainbows available to, and harvested by, the angling public.

In the early 1970's the Sport Fish staff collected biological data and made population estimates on Arctic grayling at Lower Ugashik Lake outlet. Following a period of 9 years, this work is being repeated for comparisons and for information upon which to base regulatory recommendations.

With the establishment of Lake Clark National Monument, a basic 2-year inventory study was initiated in 1978. This project is jointly funded by the State of Alaska and the National Park Service. Results have been published as a completion report in April, 1980.

Table 1 presents common and scientific names of species mentioned in the following report.

RECOMMENDATIONS

1. The Naknek River chinook salmon creel census should be continued on a biannual basis.
2. The enumeration of chinook salmon and rainbow trout in selected streams in the Naknek and Kvichak drainages should continue in order to establish a minimum spawning escapement.
3. Population estimates of Arctic grayling at Lower Ugashik Lake outlet and Ugashik Narrows should be continued.
4. The survey of selected streams within the Bristol Bay area to determine the existence of, or the potential for, a recreational fishery should be continued and information collected about the sport fishes present.

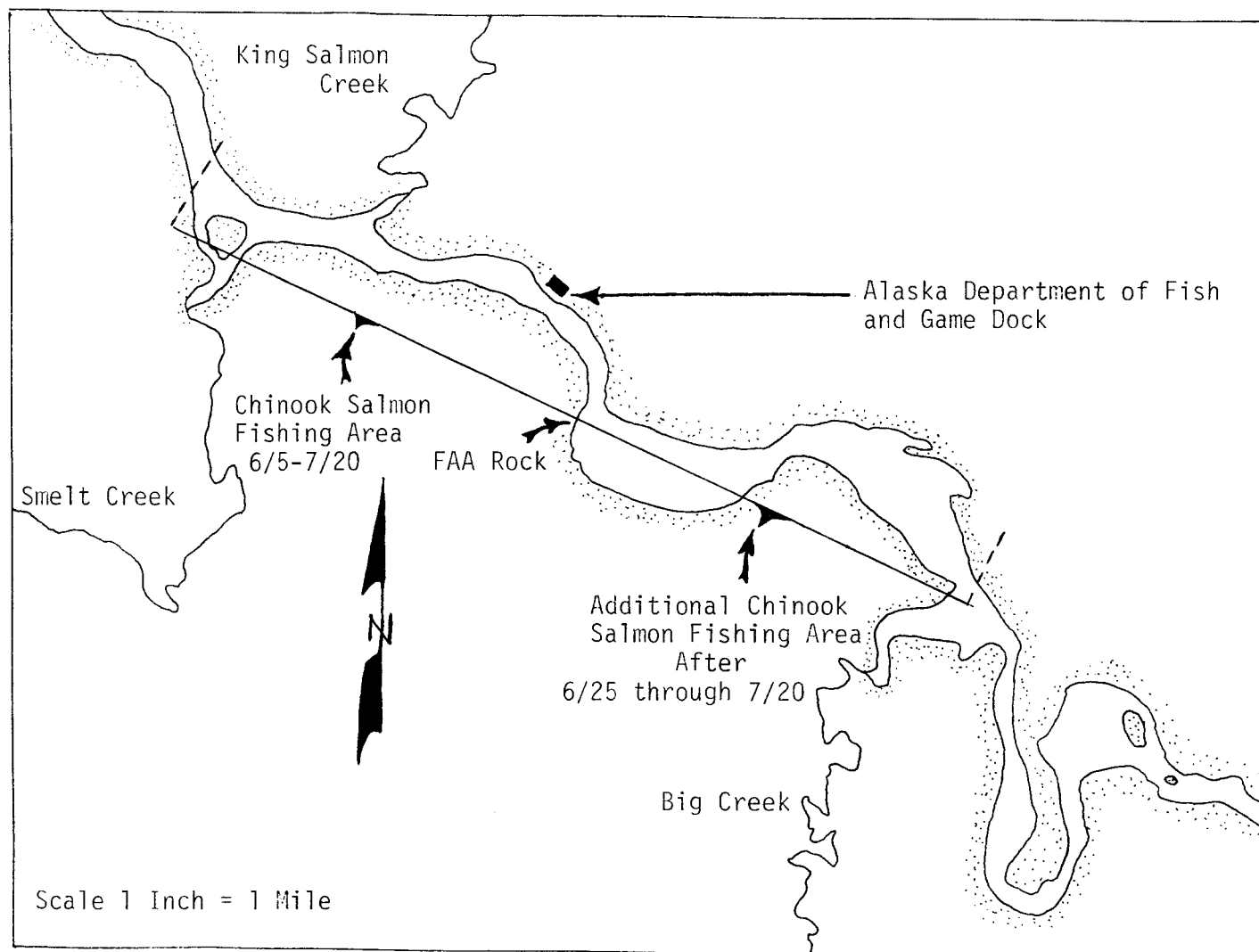


Figure 2 Naknek River at King Salmon, Alaska, Showing Chinook Salmon Creel Census Area, 1979.

Table 1. List of Common Names, Scientific Names and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Chinook salmon	<i>Oncorhynchus tshawytscha</i> (Walbaum)	KS
Rainbow trout	<i>Salmo gairdneri</i> Richardson	RT
Dolly Varden char	<i>Salvelinus malma</i> (Walbaum)	DV
Arctic grayling	<i>Thymallus arcticus</i> (Pallas)	GR

OBJECTIVES

1. To determine the distribution and utilization of sport fish species within the waters of the job area, with emphasis on the new Lake Clark National Monument.
2. To determine the magnitude of rainbow trout spawning stocks in Lower Talarik Creek, Dream Creek, Copper River, Naknek River, Brooks River and other streams as time permits.
3. To determine the magnitude of chinook salmon spawning stocks utilizing the Naknek River drainage.
4. To determine the sport harvest of chinook salmon in the Naknek River.
5. To estimate the population of Arctic grayling at Lower Ugashik Lake outlet.
6. To provide recommendations and identify future research needs relative to the management of area sport fish resources.

TECHNIQUES USED

The 1979 Naknek River chinook salmon creel census was identical in design to the 1978 creel census (Gwartney, 1979), and both were modifications of the 1975 census (Gwartney, 1976). The census was designed to estimate the sport catch of chinook salmon from the Naknek River between June 5 and July 20 (Figure 2). In addition, data were collected to estimate fishing effort, angler status and age composition of chinook salmon retained. The census required the full time effort of one man working 6 to 12 hours per day, 5 days a week.

Three time periods were selected to sample. These were:

6 a.m.	-	12 noon
12 noon	-	6 p.m.
6 p.m.	-	12 midnight

Census periods were randomly assigned to the days between June 5 and July 20. During each sample period, two counts of fishermen were made by boat. Between June 5 and June 24, counts were restricted to the river between F.A.A. Rock and Smelt Creek. After June 24, an additional area upstream to the mouth of Big Creek was included (Figure 2). Before and after each count, an attempt was made to contact each fisherman returning to one of the local docks. Each fisherman was interviewed, and his fish were measured. Scales were taken from chinook salmon for age analysis. Expansions of collected data were made by Mike Mills, the Sport Fish Biometrician in Anchorage.

Numbers of chinook salmon were estimated from aerial surveys. An observer flew each tributary near the peak of spawning and estimated numbers of spawning chinook salmon. Chinook salmon were estimated in tens or hundreds in areas of large concentrations.

The 1979 Lower Talarik Creek rainbow trout creel census was identical to past years creel census in that area. An attempt was made to contact every angler after his day of fishing, to ask him his residency, gear preference, angling time and numbers of fish caught and kept. About 90% of all anglers were interviewed.

Spawning ground counts for rainbow were obtained by walking along the banks and observing fish or by aerial surveys similar to the chinook salmon counts.

Arctic grayling at Lower Ugashik outlet and Dolly Varden char from Naknek River were caught with rod and reel, and tagged at the base of the dorsal fin with numbered, brown, FD-67 internal anchor tags made by the Floy Tag Company.

A population estimate was made on Arctic grayling at Lower Ugashik Lake outlet based on the assumption the Ugashik Lake outlet grayling population was closed (i.e., effects of migration, mortality and recruitment were negligible), sampling was random, marked and unmarked fish had the same natural mortality and catch ability and were randomly mixed, and no marks were lost. The point estimate was derived by use of Chapman's modification of the Peterson estimate. The confidence interval was derived by assuming a Poisson distribution of recaptures.

FINDINGS

Naknek River Chinook Salmon

The 1979 Naknek River chinook salmon sport harvest estimate in the river section between Smelt Creek and Big Creek for the period of June 5 through July 20 was 2,519 salmon. Total angler days expended were 4,684 and total angler hours were 17,191. Forty-three percent of the anglers checked were residents and 57% were nonresidents. Eighty percent were civilians while 20% were military. Table 2 presents age and length composition for 201 chinook salmon scales. Figure 3 presents a length frequency for all salmon measured by sex.

Chinook salmon escapement estimates for the Naknek River system are presented in Table 3. Further, estimates of catch (including subsistence) and escapement for chinook salmon in the Naknek River drainage are presented in Table 4.

Naknek River Dolly Varden Char

For the second year, Dolly Varden char were tagged in the Naknek River approximately 1 mile above Rapids Camp (Figure 4). Tagging was accom-

Table 2. Age and Length Composition of 201 Chinook Salmon Collected from the Naknek River Sport Fishery, 1979.

Age	Sex	Sample Size	Average Fork Length (mm)	Standard Deviation (mm)
1.1	Male	23	409	26
	Female	0
1.2	Male	46	636	63
	Female	0
1.3	Male	16	822	61
	Female	8	874	62
1.4	Male	45	940	62
	Female	56	962	54
1.5	Male	2	1,010	...
	Female	5	1,020	42

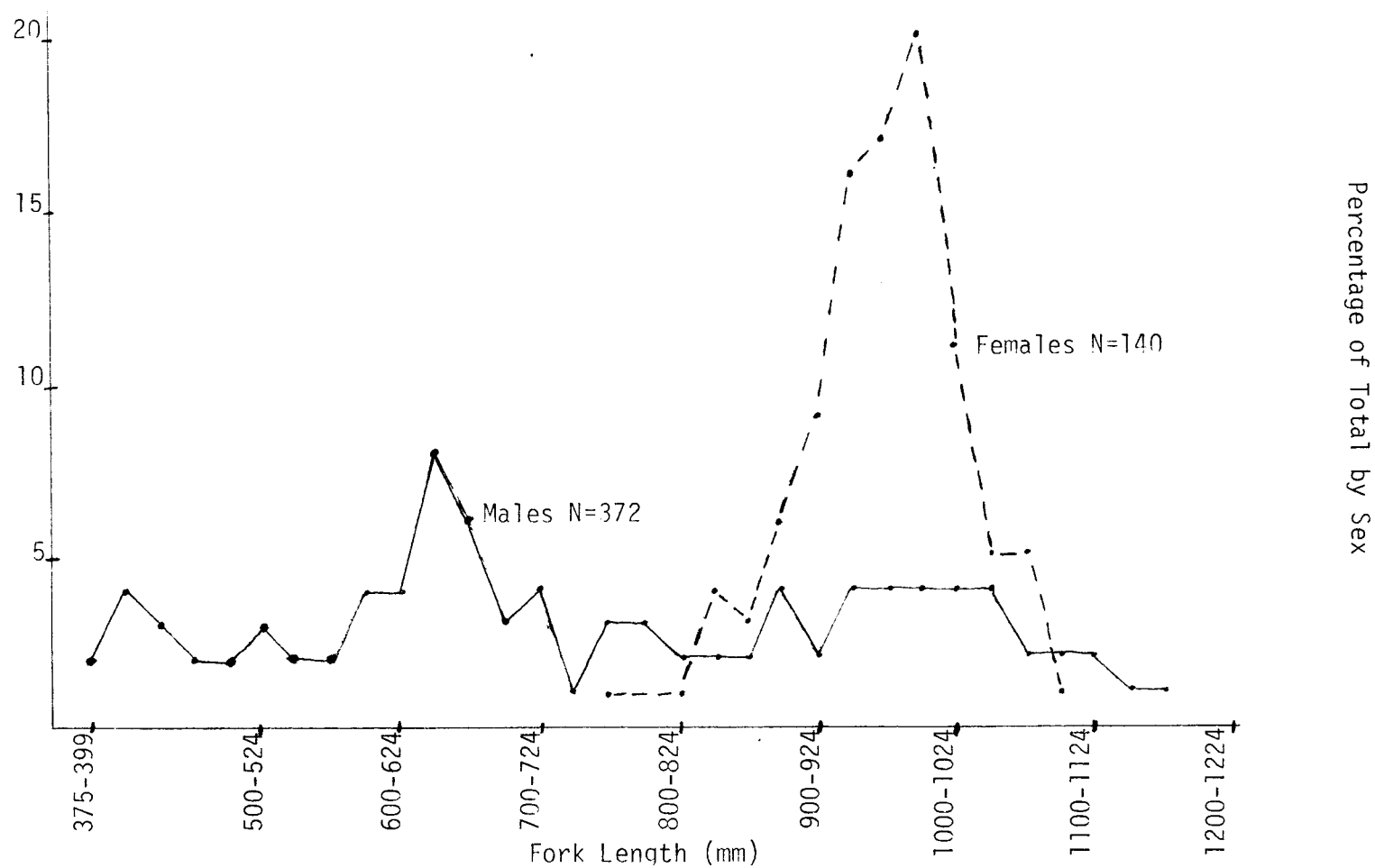


Figure 3. A Length Frequency of 512 Chinook Salmon Caught by Sport Fisherman in the Naknek River, 1979.

Table 3. Chinook Salmon Escapement Estimates, Naknek River System, 1970-1979. *

Year	King Salmon Creek	Big Creek	Pauls Creek	Mainstream Naknek River	Estimated Total (Mid-Point)
1970	260	1,600	No Count	2,500	4,360
1971	740	490	52	1,620	2,902
1972	1,224	1,060	156	351	2,791
1973	115	1,106	No Count	1,300-1,600	2,671
1974	600-800	1,200-1,300	250	400-500	2,650
1975	350-400	800-850	200-250	2,250-2,750	3,925
1976	350-450	1,300-1,500	75-125	7,000-7,500	9,150
1977	2,200-2,500	2,600-2,800	No Count**	5,500-6,000	10,800
1978	250-350	4,600-5,000	200-300	3,000-5,000	9,350
1979	1,500-2,000	3,300-4,000	-	1,500-2,000	7,150

* Aerial Surveys

** High Water

Table 4. Estimated Harvest and Escapement of Chinook Salmon in the Naknek River System, 1970-79.

Year	Estimated Sports Catch	Estimated Subsistence Harvest	Estimated* Escapement	Totals (Exclusive of Commercial Harvest)
1970	2,730***	300	4,360	7,390
1971	2,417***	200	2,866	5,483
1972	1,668***	400	2,791	4,859
1973	1,000	600	2,671	4,271
1974	1,700	900	2,650	5,250
1975	427***	600	3,925	4,952
1976	800	700	9,150	10,650
1977	1,000	1,200	10,800	13,000
1978	2,406***	1,100	9,350	12,856
1979	2,669****	1,450**	7,150	11,269

* Includes all tributary streams surveyed.

** Preliminary.

*** Estimate based on a formal creel census.

**** Estimate based on a formal creel census between 6/5/79 and 7/20/79 of 2,519 salmon. Additional is estimate before and after this period.

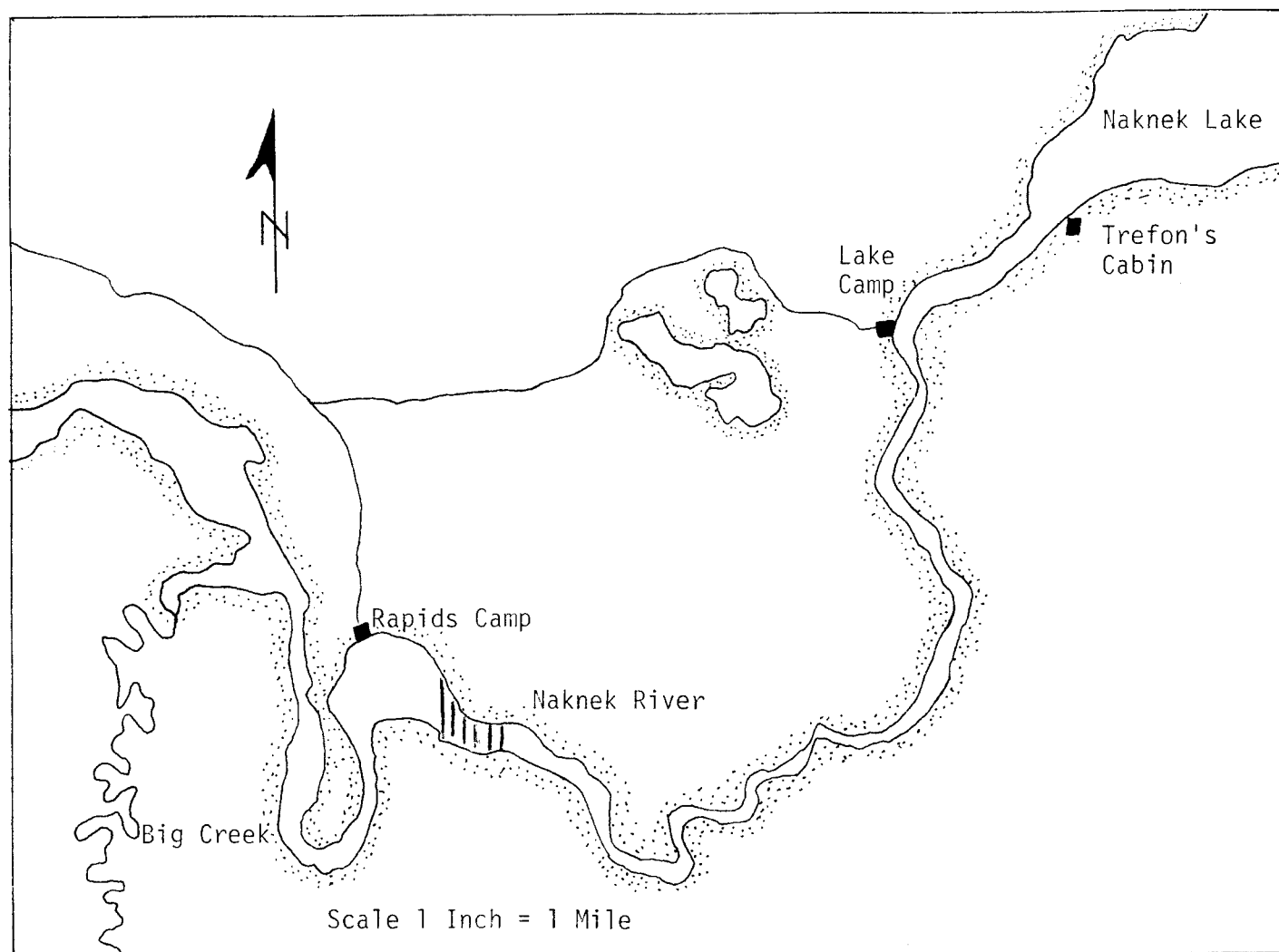


Figure 4. Upper Naknek River Showing the Area of Springtime Dolly Varden Concentrations.

plished in April and May of 1979. Table 5 presents a length frequency of fish tagged in both years. To date, no tags have been recovered.

Rainbow Trout Surveys

Rainbow trout spawning surveys were again conducted in April and May 1979, in selected index streams in the Naknek and Kvichak drainages (Table 6). These surveys, continuous since 1972, provide an annual comparison of the numbers of large rainbows available to spawn and subsequently available to the angling public. Since most large rainbow trout spend most of the summer associated with the lake environment, these spring surveys are the only time visual observation of their numbers is possible.

Efforts at Lower Talarik Creek on the north shore of Lake Iliamna consisted of the annual spring spawning survey (Table 6), and a 19-day creel census between September 4 and September 24. The aerial spawning count found between 1,900 and 2,100 large rainbow trout present in Lower Talarik Creek. During the September fishing period, 314 anglers caught 1,185 rainbow trout of which only 5 were retained. Sixty-four percent of the anglers were nonresidents and 56% were residents. A total of 233 fly fishermen kept 31 rainbows, while 91 lure fishermen kept 24 rainbows. Of the 55 rainbows retained, 47 were measured. Twenty-one were under 508 mm in length, with a mean of 337 mm, and 26 were over 508 mm with a mean of 706 mm.

Lower Ugashik Lake Outlet Grayling Survey

Between July 28 and August 5, 1979, Arctic grayling were again captured at Lower Ugashik outlet (Figure 5). The purpose of this survey was to recapture tagged fish released in 1978 (Gwartney, 1979), tag additional Arctic grayling and collect length-weight data. During the time period, 226 grayling were caught of which 21 had been tagged in 1978. Figure 6 presents length frequencies for both the 1978 and 1979 sampled. Arctic grayling averaged 417 mm in fork length and 976 grams. The population estimate was 2,053 fish with a 95% confidence interval of 1,369 to 3,227 Arctic grayling.

DISCUSSION

The first chinook salmon reported caught this year was on May 17. Within the period May 17 to June 5, and after July 20, an estimated 150 chinook salmon were caught and retained, bringing the total estimated sport harvest to 2,669 fish. Prior to this year, the chinook sport fishery has closed on July 18 but, as a result of Board of Fisheries action, the seasonal time limit was dropped this year. Although plenty of chinook and jack salmon were available after July 18, fishing effort dropped significantly after July 15. I discontinued the creel census on July 20 when only eight anglers were observed in a 6-hour period (Table 7).

The 1979 Naknek chinook salmon sport fish harvest was the highest since 1970 when the catch was 2,730 fish. The 1979 estimate was 203 fish more than last year's estimate. The total angler days was lower, however, in 1979 than 1978 by 358 days. This decrease in effort and increase in catch reflects a good run of chinook salmon to the Naknek River in 1979.

Table 5. Length Frequency of Naknek River Dolly Varden Tagged at Rapids Camp During April and May, 1977 and May, 1979.

Total Length (mm)	Frequency			
	1977		1979	
	Number	Percent	Number	Percent
276-300	2	1		
301-325	6	4	1	1
326-350	14	9	7	6
351-375	23	15	11	9
376-400	13	<u>9</u>	16	<u>13</u>
Sub Total		39		29
401-425	26	18	15	12
426-450	27	18	19	16
451-475	15	10	18	15
476-500	11	<u>7</u>	15	<u>12</u>
Sub Total		53		55
501-525	7	5	12	10
526-550	2	1	4	3
551-575	1	1	3	2
576-600	1	<u>1</u>	-	<u>-</u>
Sub Total		7		15
600-625	-		1	1
Total	148		122	

Table 6. A Summary of Rainbow Trout Spawning Surveys Made on Streams in the Naknek and Kvichak Drainages, 1973-1979.

Stream	Number of Rainbow Trout Spawners						
	1973	1974	1975	1976	1977	1978	1979
Copper River	102	91	85	*	400-500	250-350	200-250**
Brooks River	150	169	88	100	125-175	125-150	250-300
Lower Talarik Creek	1,000	1,200	1,100	1,000	800	1,100-1,200**	1,900-2,100**
Dream Creek	218	43	46	200-250	138	175-225	*

* No count possible due to turbid waters.

** Aerial survey.

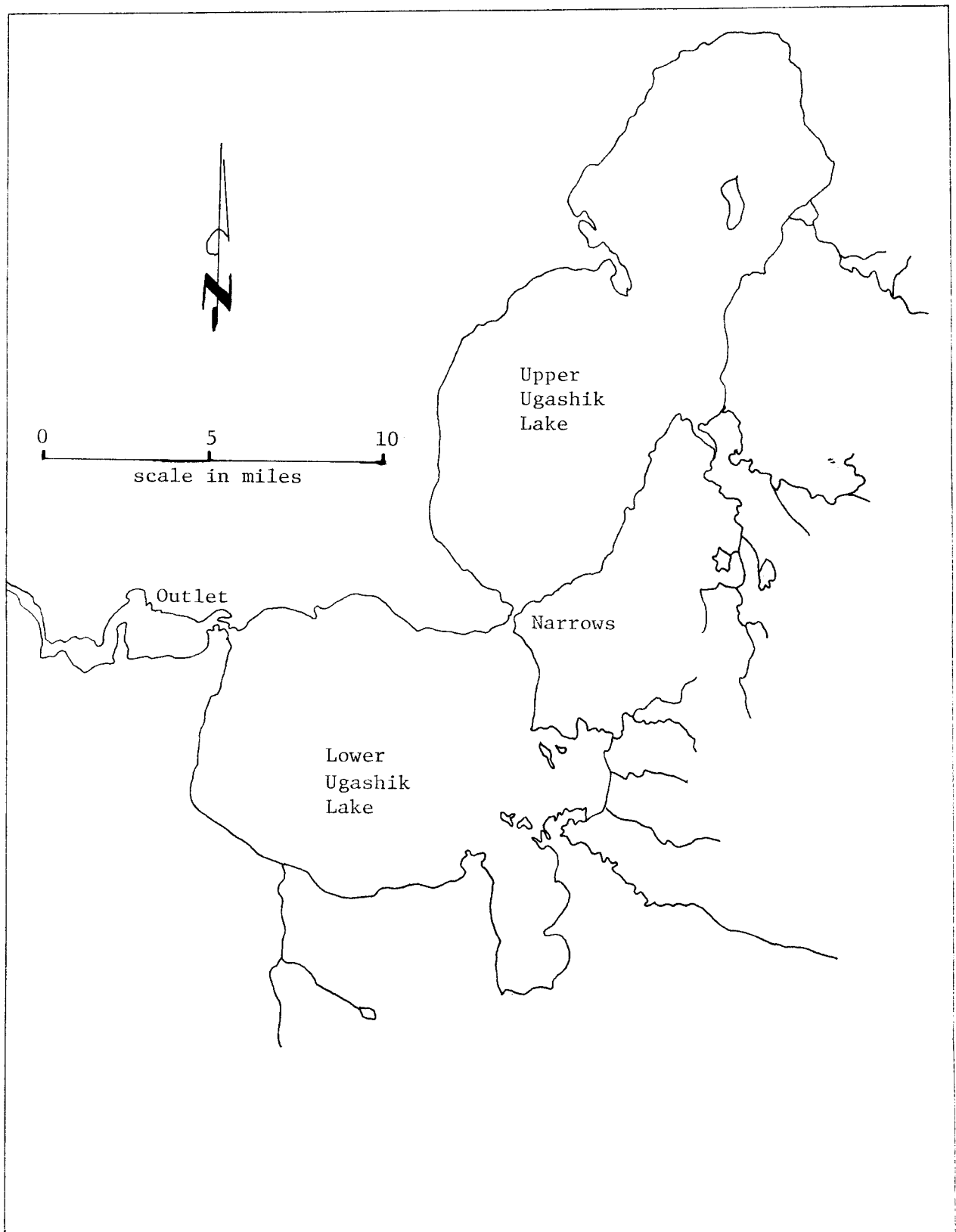


Figure 5. Upper and Lower Ugashik Lakes

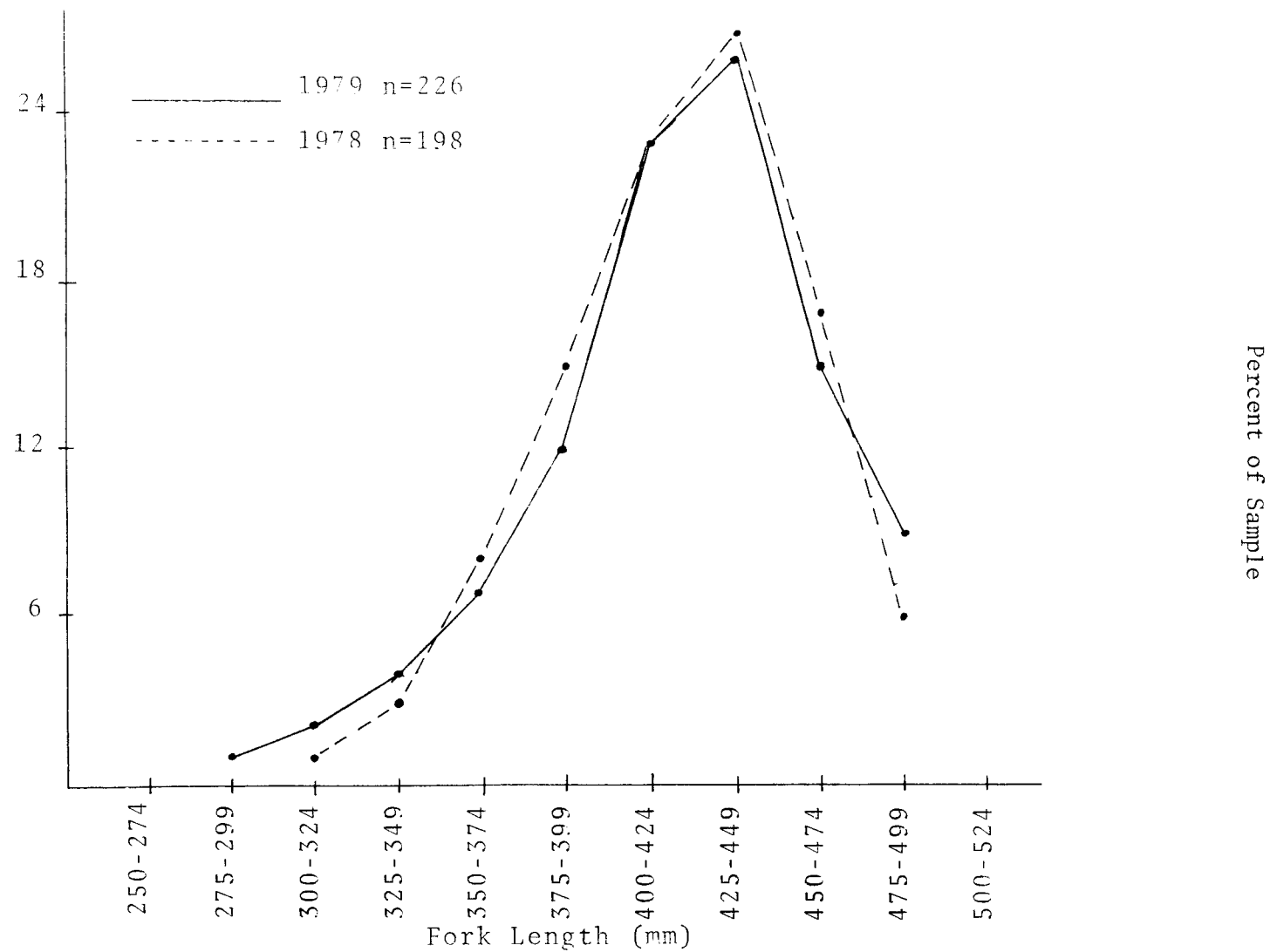


Figure 6. Length frequencies of Arctic Grayling from Lower Ugashik Outlet comparing samples taken in 1978 and 1979.

Table 7. Naknek River Chinook Salmon Creel Census Data, Collected
Between June 5 and July 20, 1979.

Date	Number Fishermen Checked	Number Hours Fished	Number Chinook Kept
6/05/79	42	128.75	14
6/06/79	33	94.25	7
6/08/79	20	51	1
6/09/79	33	75	2
6/10/79	37	120	28
6/14/79	0	0	0
6/15/79	8	16	10
6/16/79	105	325	54
6/17/79	10	20	4
6/18/79	17	43	15
6/19/79	15	26.75	9
6/21/79	71	306	28
6/23/79	51	158	15
6/24/79	62	234.25	44
6/26/79	27	60	20
6/27/79	55	231.5	29
6/29/79	56	260	45
6/30/79	47	169.25	35
7/01/79	26	95	23
7/03/79	53	288.25	43
7/05/79	5	10	2
7/07/79	13	45	3
7/08/79	67	334.75	27
7/10/79	14	32	7
7/11/79	31	162.25	24
7/12/79	34	139.5	16
7/14/79	31	110.5	15
7/15/79	28	94	14
7/16/79	8	19	0
7/17/79	15	32	3
7/20/79	8	20	7
Total	1,022	370.00	544

Similar to 1978, a significantly large number of chinook scales were collected for age analysis. Females were predominately 4-ocean age fish with only a few 3 and 5-ocean age fish measured. Males were of all ages from 1 through 5-ocean age with 2-ocean age jacks in greater abundance than any other age class.

The 1979 estimated escapement of 7,150 chinook salmon for the Naknek drainage is extremely conservative. Due to timing and continued poor weather, conditions for aerial surveys were minimal. Peak estimates were all made prior to July 26 when fish appeared well distributed over the spawning areas, however chinook salmon continued to enter the system through August 1 and spawning chinook salmon were observed in good numbers in the Naknek River as late as September 5.

Although no estimate of optimum number of spawners have ever been made for the system, it is apparent from the data (Table 4) that more than ample chinook salmon are reaching the spawning grounds. Escapements between 1971 and 1975 ranged from 2,650 to 3,925 fish annually for the entire drainage. These relatively low escapements were parent to the large runs since 1976 and resulted in escapements averaging nearly three times the respective parent run. Increases of similar magnitude have been apparent in both the subsistence and commercial catches since 1976.

I did not attempt a survey on Paul's Creek this year, since previous counts have always been highly questionable due to water color and difficulty in flying an accurate survey. Paul's Creek is extremely narrow and meanders a great deal.

The length distribution of Dolly Varden char captured in 1979 is similar to the 1977 sample. Although there is a fair spring effort on Dolly Varden char immediately downstream of the tagging area, no tags have been returned to this office. The three apparent conclusions are:

- 1) The population is very large with respect to the number of fish tagged,
- 2) Outmigration takes place at a rapid rate resulting in the fish passing quickly through the sport fishery,
- 3) Fishermen are not returning tags.

Rainbow trout spawning surveys conducted in 1979 indicated relatively stable populations in the Copper and Brooks rivers compared to 1978. Lower Talarik Creek was significantly higher with an aerial count of 1,900-2,100 spawning rainbows. This is the highest count on record and an increase of 700 to 900 fish over 1978.

September fishing efforts and the catch release ratios at lower Talarik Creek were similar to previous years with only 4% of the rainbows caught retained. This level of harvest is minimal and certainly not harmful to the rainbow trout population.

The Arctic grayling population of lower Ugashik outlet appears stable and the length frequency distribution appears essentially the same as 1978 data (Figure 6). The population point estimate of 2,053 fish is higher than estimates made in either 1969 or 1971, 1,952 and 1,180 fish respectively (Paddock, 1970 and Siedelman, 1972).

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